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ABSTRACT

This study investigated the role of gesture in communication development. Gestural categories, based on communicative function, were identified from longitudinal videotapes of one mother-child pair. The videotapes were made weekly or bi-weekly from the time the child was 13 months of age until she was 42 months of age. The results of the study indicated that gestures can be reliably delineated. In addition, the gestures served a number of communicative functions: (1) attention directing, (2) referent specifying, (3) requesting information or action, (4) supporting the verbal message, and (5) answering yes/no questions. Although the pair's activity influenced the gestural category utilized, a developmental pattern emerged. As the child's linguistic sophistication increased, the mother's use of gestures decreased and the child's increased. The results are discussed with respect to the available literature. (Author/AMH)

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THE ROLE OF GESTURE IN COMMUNICATION DEVELOPMENT

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Mary Ann Ronski

Abstract: This study investigated the role of gesture in communication development. Gestural categories, based on communicative function, were identified from longitudinal videotapes of one mother-child pair. The results of the study indicated that gestures can be reliably delineated. In addition, they served a number of communicative functions: (1) attention directing; (2) referent specifying; (3) requesting information or action; (4) supporting the verbal message and (5) answering yes/no questions. Although the pair's activity ~~to~~ influenced the gestural category utilized, a developmental pattern emerged. As the child's linguistic sophistication increased, the mother's use of gestures decreased and the child's increased. The results are discussed with respect to the available literature.

Observations of the interactions between mothers and their young children indicate that gestures play an integral part in the child's early communication development (Dore, 1974; Bruner, 1975a,b; Bates, Benigni, Bretherton, Camaioni and Volterra, 1977; Moerk, 1977 and Garnica, 1978). Not only do children produce gestures during this time, but mothers' communicative input to their children contains a gestural component (Garnica, 1978; Gutmann and Turnure, 1979; Murphy, 1978 and Murphy and Messer, 1977). The literature to date, however, has not specified gestures and their communicative functions or the changes in mother-child gestural usage patterns over time. Therefore, this paper will describe a reliable gesture classification system, based on communicative function, and the findings of a longitudinal study of gestural usage in one mother-child pair.

The literature suggests that there is a general association between children's gestures and their later communication development. Dore (1974) described the primitive speech act and suggested that two important parameters in the classification of these single words or prosodic patterns were the child's non-linguistic behaviors (i.e., gestures and facial expressions) and the adult's responses, both verbal and non-verbal. Bruner (1975a,b) supported Dore's hypothesis and proposed that accompaniments to utterances, such as pointing, provided a second set of cues for the adult's interpretation of the child's intent. Several studies have supported the notions of Dore and Bruner.

Bates and her colleagues (1977) investigated pre-speech gestural communication in a longitudinal study of 25 children from nine to thirteen months of age. The analysis of their data yielded a single

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gestural complex (pointing, giving, showing and ritualized request) that seemed to be based on the use of conventional signals for communication purposes. An inter-dependence between language development and the measures that formed the gestural complex was noted. This relationship increased across sessions and suggested that language was not replacing gestural communication but rather that both continued to develop simultaneously. Moerk (1977) expanded this notion by proposing that as children gain linguistic sophistication, their gestures serve to complement and support the verbal message.

While the Bates et al. (1977) study described a number of gestural categories, most other studies have focused their attention on the pointing gesture. Peach and Cupples (1978) investigated the relationship between the observation of communicative pointing and the development of words in two sets of twins, age 12 and 18 months. They did not find a significant correlation between communicative pointing and referential or non-referential words. Thus, they speculated that communicative pointing might act as a regulating device for seeking joint attention and joint activity between the mother and the child. Their finding supported Bruner's (1975a,b) notion that the pointing gesture served as a strategy for enlisting aid in joint activity and as a cue for interpretation by the adult, rather than playing a specific role in the development of word usage.

Ninio and Bruner (1978) presented preliminary observational data from one mother-child pair to provide further support for the notion that pointing, per se, was not used to label pictures. Instead, they suggested that it forced the parent to pay attention to the child's demand for a label. This notion adds support to Bruner's (1975a,b) earlier notion and the findings of Peach and Cupples (1978).

Murphy (1978) investigated the role of the pointing gesture in the context of a dyadic interaction between 32 mother-child pairs. She found that 20 and 24 month old children used pointing gestures more frequently than nine and fourteen month old children. Furthermore, she found that the older children used gestures along with their verbalizations. This particular finding lends support to the notion of Bates and her colleagues (1977) who suggested that verbal and non-verbal communication develop simultaneously.

The studies (Bates et al., 1977; Murphy, 1978; Ninio and Bruner, 1978 and Peach and Cupples, 1978) discussed above indicate that children's gestural usage plays a role in their communication development. Furthermore, instead of preceding verbal development, gestures and speech appear to develop simultaneously.

Another source of information on the role of gesture in communication development is the study of mothers' gestural input to their

young children. Moerk (1977) suggested that mothers consistently use gestures to train their children's oral language. A number of data-based studies lend support to Moerk's claim.

Garnica (1978) examined the frequency and type of nonverbal cues accompanying mothers' direct requests for action to their children and observed how these cues varied with the child's response. She found that mothers of one year olds frequently used pointing gestures, while mothers of three year olds used them only after the request for action had been repeated several times. The preliminary observational data suggested that the adult adapted certain nonverbal strategies, such as pointing, as an adjustment to the young child's limited understanding.

Instead of gestures associated with a specific communicative function, Murphy and Messer (1977) identified factors that influenced the child's comprehension of the mother's pointing gesture. In general, they found that pointing was the primary method whereby the mother attracted the infant's attention to a particular object. This finding supports and expands Bruner's (1975a,b) notion concerning the role played by the pointing gesture. A decrease in the number of pointing gestures used by the mothers was also noted as the children's age increased from nine to fourteen months.

Murphy (1978), previously cited, was also interested in the way mothers used pointing gestures in the context of a dyadic interaction with their children. Her results indicated that mothers synchronized their pointing with verbal labeling from the time the children were nine months of age. At about two years of age mothers asked their children to name the referent rather than supplying its name. Again, these findings lend support to the notions of Bruner (1975a,b) and Ninio and Bruner (1978) concerning the role of the pointing gesture in communication development.

Gutmann and Turnure (1979) investigated the production of illustrative hand and arm gestures by mothers communicating with their pre-school children. In general, they found that mothers produced illustrative hand and arm gestures when describing an event or directing their children in an activity. They also found that the pair's activity played a major role in determining the amount and type of the gesture produced.

These studies (Garnica, 1978; Gutmann and Turnure, 1979; Murphy, 1978 and Murphy and Messer, 1977), indicated that the amount and type of the mother's gestural input were influenced by the children's age, linguistic sophistication and the activity in which the pair were engaged.

Although all the studies of children's gestural usage and mothers'

gestural input to their children point to the importance of gestures in communication development, major weaknesses are evident in the data-based literature. First, there was no consistent, reliable definition or classification of gesture. Second, chronological age was utilized as an indicator of the child's linguistic sophistication rather than linguistic measures. Third, with the exception of Gutmann and Turnure (1979), reliability measures on the occurrences of gestures were not reported. It seems important to specify and control the above-mentioned variables if the role that gestures play in the child's early communicative development is to be determined.

Such apparent weaknesses suggested that a more thorough investigation into the role of gesture in communication development was necessary. The purpose of the study to be described in the following section was twofold: 1) to determine if one could reliably identify gestures and their communicative functions and 2) to specify the changes that took place over time in a mother's and child's use of such gestures.

Method

Since this study was part of a larger ongoing longitudinal research project, the information pertaining to subjects and recording sessions utilized in the original study will be reviewed.

Subjects The subjects of this study were a mother-child pair who were videotaped weekly or biweekly from the time the child was 13 months of age until she was 42 months of age. The child was the third of four children and the only girl. The fourth child was born during the taping period. All family members were native speakers of English. The father was a university professor and the mother was a part-time pharmacist during the taping.

Recording Sessions Videotape equipment¹ was placed in the home. It was arranged by the parents for the taping at a time convenient to the mother. The only instruction given the mother was: Encourage your child to talk. Analysis of the videotapes was not initiated until all of the taping sessions were completed.

The following post-hoc procedures were specific to this study:

Definitions: A gesture was defined as the motion of the head or upper limbs that signified a specific communicative function. The upper limbs were defined as the arms, hands and/or fingers in either unilateral or bilateral motion. Six gestural categories based on the communicative functions they served within the interactions were identified:

- I. A gesture used to identify an object, action or person (e.g.,

- pointing to a picture in a book).
- II. A gesture used to ask for or demand an object or a person to perform an action (e.g., whole hand held open near an object).
 - III. A gesture used to confirm occurrence or express agreement (e.g., a vertical head nod).
 - IV. A gesture used to negate existence, reject or deny an object, person or what a person said (e.g., a horizontal head shake).
 - V. A gesture used to replicate a gesture just produced by the other member of the pair.
 - VI. A gesture that has a communicative function but does not fit into any of the other categories (e.g., waving bye-bye).

Sample selection: Thirty-five two-minute samples were chosen from the data set. The mother and child were clearly visible on all the samples. Tapes were selected at two week intervals for the first year and on a monthly basis thereafter.

Procedures: An Esterline-Angus event recorder was utilized to record occurrences of the gestures within each category. This recorder provided a continuous printout and thus aided in the calculation of point-to-point reliability. The 35 samples were viewed twelve times. During each viewing the investigator was concerned with occurrences of one gestural category for one member of the pair (e.g., mother, Category I). The number of occurrences of each gestural category for each sample was tallied. The samples were then divided into linguistic stages based on the child's mean length of utterance (MLU) (Brown, 1973). This division allowed the investigator to examine the changes that took place in the mother's and child's use of gestures as the child's linguistic sophistication increased.

Reliability: Reliability of the investigator's judgments of the occurrences and categorization of the gestures was assessed by three observers. They viewed 20% of the 35 samples, that is 84 ten-second samples, and recorded occurrences of the gestures meeting the definition of a gesture. Then, they viewed the agreed-upon occurrences and placed them into one of the six categories.

The percentage of agreement with the investigator on occurrences of gestures ranged from .75 to 1.00 with a mean of .81. Intra-observer reliability was .85. Categorization reliability judgments for the three observers ranged from .90 to 1.00 with a mean of .98. Intra-observer reliability for categorization judgments was 1.00.

Results and Discussion

Categories II, V and VI occurred less than ten times on the total samples. Although Bates and her colleagues (1977) suggested that requesting gestures occurred as early as nine to thirteen months of

age, Category II gestures, which appeared to be similar to the requesting gestures, might have been restricted by the pair's activities. Since they were recorded as both Category I and V gestures, Category V gestures were classified as a subcategory of Category I gestures. Although all of the child's Category V gestures replicated the mother's Category I gestures, they also served the same function and were limited to the picture book activity. Due to these limitations these three categories were not analyzed. Therefore, the analysis of the data focused on Categories I, III and IV.

It was necessary to specify the pair's activities prior to determining the way in which the gestures functioned and the changes that occurred over time. This finding lends support to Gutmann and Turnure's (1979) work. They found that there was an interaction between the types of gestures used and the activities of the mother-child pairs. The interaction between the percentage of occurrence of the gestures and the activities is shown in Figure 1. The sampling procedure that was utilized did not provide an equal number of samples for each activity at each linguistic stage. Of the 35 samples, 31% were picture book

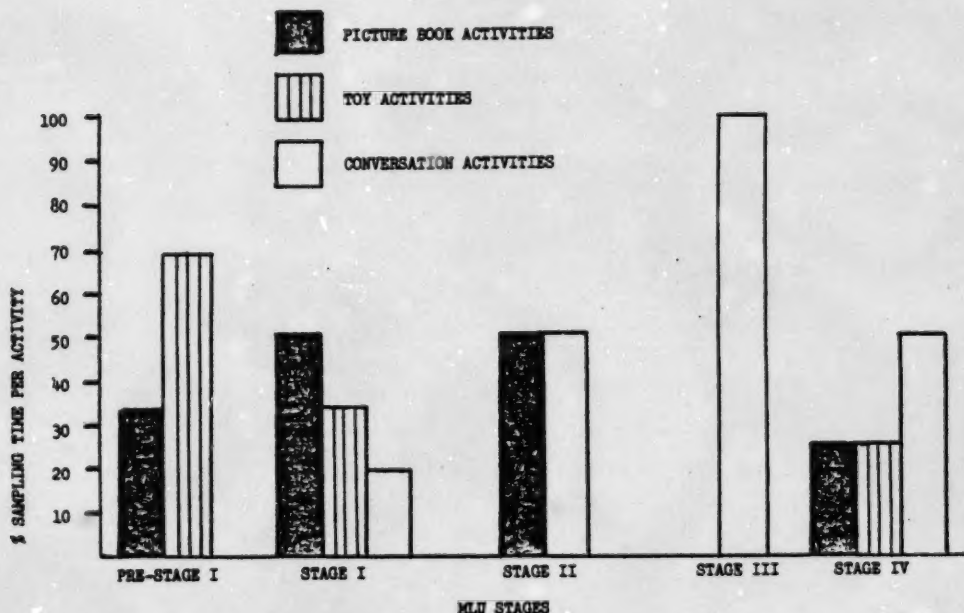


Figure 1. The percentage of sampling time for each activity.

activities, 49% were toy activities and 20% were conversation activities. Toy activities predominated during the early linguistic stages, while conversation activities occurred more frequently during the later linguistic stages. Picture book activities occurred throughout the samples.

Category I Gestures Figure 2 represents the percentage of occurrence of Category I gestures across linguistic stages. At each stage the gestures were divided into those of the mother and child for each activity.

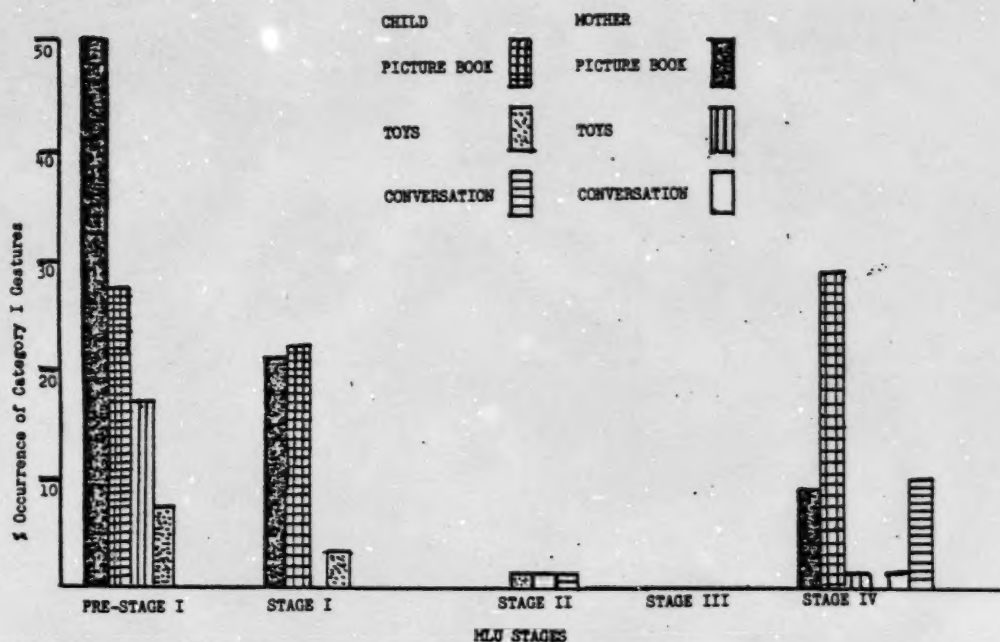


Figure 2. The percentage of occurrence of Category I gestures of the mother and child for each activity across MLU stages.

The majority of these gestures, 81% of the mother's and 76% of the child's, occurred during the picture book activities. The mother's use decreased across stages, while the child's remained quite consistent, ranging from 22% to 29%. For the toy activities, both mother and child used less gestures across stages. As the conversation activities predominated, the child's use of these gestures increased. In general, the mother's use of Category I gestures decreased as the child's linguistic sophistication increased. These results are consistent with those of Murphy and Messer (1977). They also found that mother's

pointing gestures, which made up the majority of Category I gestures, decreased as the child's age increased.

To specify the way in which these gestures functioned within the context of the communicative interaction, the gestures were classified according to the contexts in which they occurred. Five contexts were specified for Category I gestures:

1. Verbal Designation in which the gesture accompanied a verbal label and called attention to the referent (e.g., "There's a bunny.").
2. Request for Information in which the gesture accompanied a verbal request for information and called attention to the requested referent (e.g., "What's that?").
3. Attention Directing in which the gesture accompanied a verbal direction and called attention to the direction of the referent or location (e.g., "Look here.").
4. Request for Action in which the gesture accompanied a verbal request for the person to perform an action and called attention to the referent (e.g., "Do it this way.").
5. Nonverbal Answer in which the gesture functioned to answer a question with no accompanying verbalization.

Figure 3 depicts the percentage of occurrence of Category I gestures within each of these contexts. The most frequently occurring

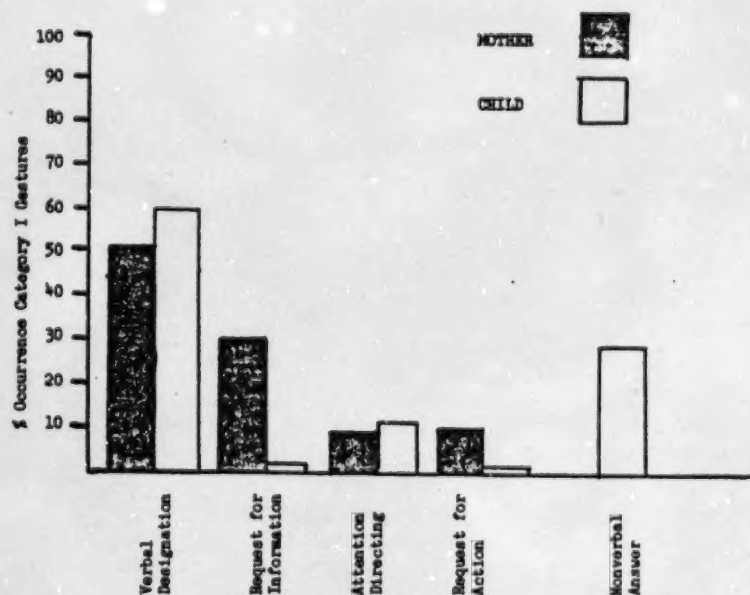


Figure 3. The percentage of occurrence of Category I gestures within five communicative contexts.

context was verbal designation for both the mother and the child. The mother also used the gestures with verbal requests for information and action. Both members of the pair used these gestures with attention directing statements. It is also interesting to note that the child used 29% of her Category I gestures to answer questions nonverbally. In general, then, the role of Category I gestures remained consistent across communicative interactions as they primarily served an attention directing function. This finding supports the notion proposed by Ninio and Bruner (1978) and the findings of Murphy and Messer (1977) which suggest that pointing gestures serve an attention directing function.

Category III Gestures The percentage of occurrence of Category III gestures of the mother and child for each activity across linguistic stages is illustrated in Figure 4. The mother's gestures were equally distributed across the three activities, while the child used 69% of

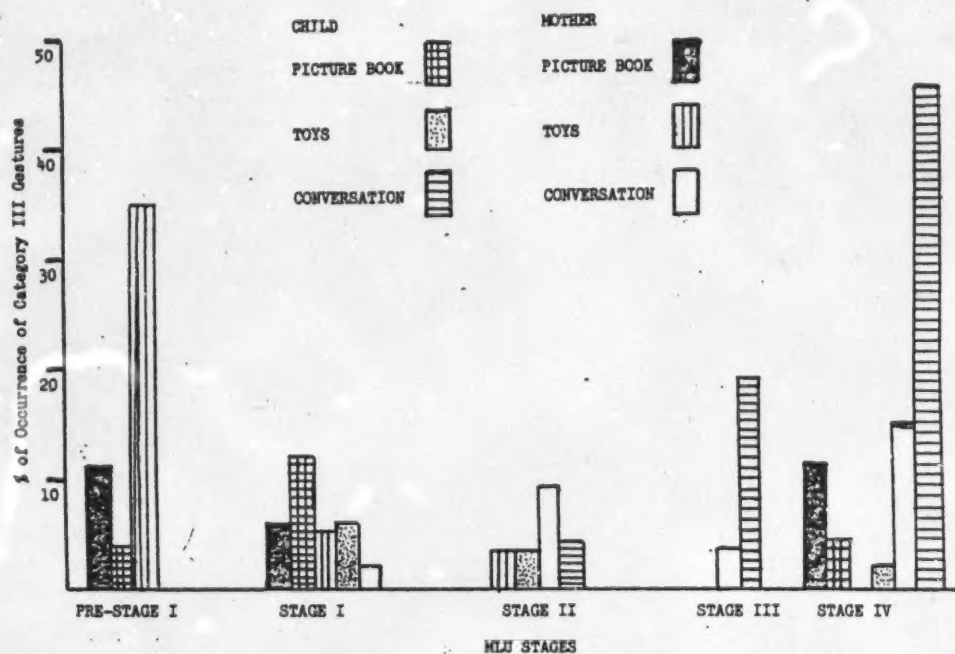


Figure 4. The percentage of occurrence of Category III gestures of the mother and child for each activity across MLU stages.

her Category III gestures in the conversation activities. In addition, the frequency of the child's use of these gestures increased from 4% at Stage II to 46% at Stage IV. This result supports Moerk's (1977) notion that as children gain linguistic sophistication their gestures serve to complement and support the verbal message.

As with Category I gestures, the contexts of the communicative interactions in which Category III gestures occurred were specified. Two contexts were identified:

1. Affirmative Nonverbal Answer in which the gesture functioned to answer a question with no accompanying verbalization.
2. Affirmative Statement in which the gesture accompanied an affirmative verbal statement (e.g., "Yes, that's a ball.").

Figure 5 depicts the percentage of occurrence of Category III gestures within each of these contexts. The mother consistently used

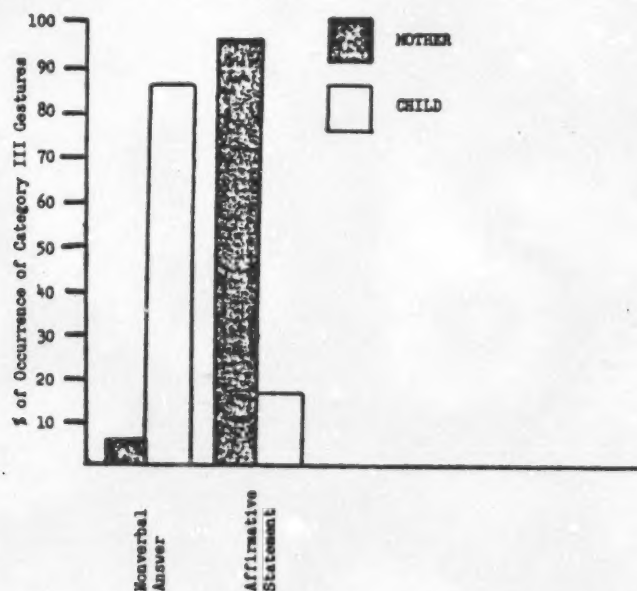


Figure 5. The percentage of occurrence of Category III gestures within two communicative contexts.

most of her Category III gestures, 95% to accompany an affirmative statement, while the child used only 15% of this category for this purpose. The majority of the child's Category III gestures, 85%, were used to answer a question with no accompanying verbalization.

In general, Category III gestures served different functions for the mother and child. While these gestures generally served a redundant function for the mother, the child used these gestures to answer yes/no questions nonverbally (e.g., "Do you like the baby?"). These findings also serve to support Moerk's (1977) notion that gestures serve to support and/or complement the verbal message.

Category IV Gestures Figure 6 represents the percentage of occurrence of Category IV gestures across linguistic stages. As with the two preceding categories, these gestures were divided at each stage into those of the mother and the child for each activity. The mother's

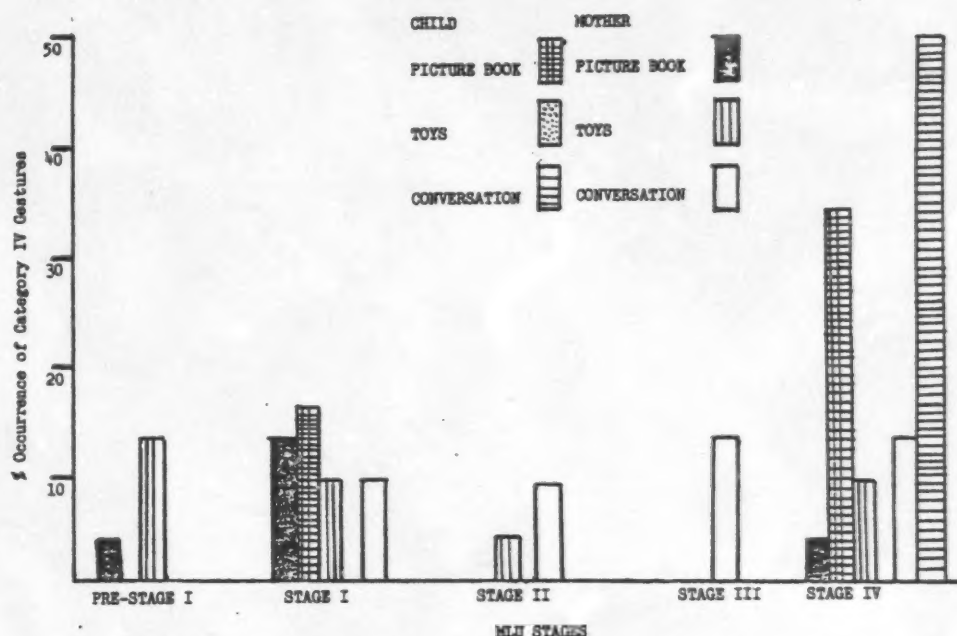


Figure 6. The percentage of occurrence of Category IV gestures of the mother and child for each activity across MLU stages.

gestures were distributed across all stages and all activities with a range of four to thirteen percent. The child's use was distributed equally between picture book and conversation activities. Although some of these gestures were noted as early as Stage I, they predominated during Stage IV.

Again, the contexts of the communicative interactions within which the gestures occurred were specified. Two contexts similar to those utilized for Category III gestures were employed:

1. Negative Nonverbal Answer in which the gesture served to answer a question with no accompanying verbalization.
2. Negative Statement in which the gesture accompanied a negative verbal statement (e.g., "There's no doorbell.").

Figure 7 depicts the percentage of occurrence of Category IV gestures within each of these contexts. 95% of the mother's Category

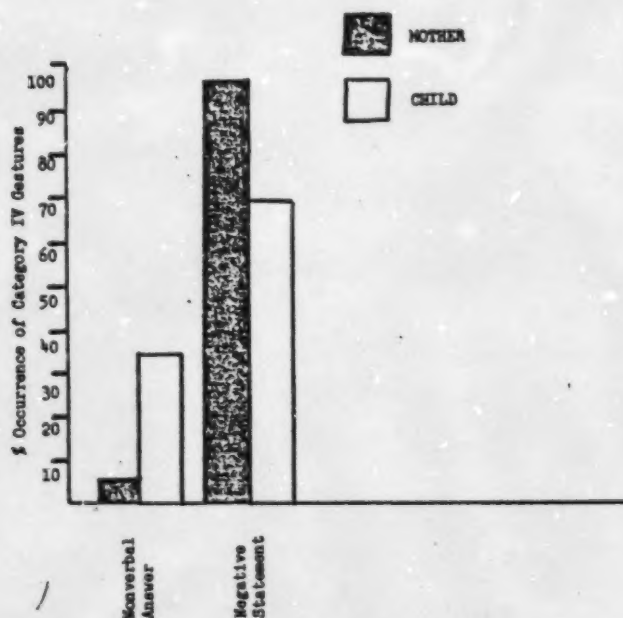


Figure 7. The percentage of occurrence of Category IV gestures within two communicative contexts.

IV gestures and 67% of the child's gestures accompanied a negative statement. The child used 33% of this gestural category to answer a question nonverbally. In general, both the mother and the child used the majority of their Category IV gestures to support a negative statement. Although the child did use one-third of this category to answer questions nonverbally, this function did not predominate as it did for Category III gestures. These findings also lend support to Moerk's (1977) claim that gestures serve to support and complement the verbal message as the child gains linguistic sophistication.

Summary and Conclusions

The first purpose of this study was to determine if gestures could be reliably identified and categorized by communicative functions. The results of this study indicate that gestures and their specified categories can be reliably identified. Furthermore, the designated categories were also found to be context specific. That is, the majority of Category I gestures occurred during the picture book activities, while Category III and IV gestures occurred more frequently during conversation. Although the particular gestural categories were activity specific, the communicative functions they served spanned more than one activity. A number of different communicative functions were identified: 1) attention directing; 2) referent specifying; 3) requesting information; 4) supporting the verbal message and 5) answering yes/no questions. Category I gestures served all of the above communicative functions, while Category III and IV gestures served to support the verbal message and answer questions nonverbally.

The second purpose of this study was to specify the changes that took place over time in the mother's and child's use of these gestural categories. In general, the mother's use of gestures decreased over time, while the child's increased. As previously reported, however, there was an interaction between the activity and the gestural categories identified. The predominant activity changed as the child's linguistic sophistication increased. Thus, it is not certain whether the changes that occurred were real or an artifact of the data.

Further investigation into the role of gesture in the child's communicative development is certainly warranted. First, both longitudinal and cross-sectional replication of this study with a larger sample of mothers and their normal and/or language impaired children is necessary. Second, future investigation should further specify the relationship between the activity that the pair were engaged in and the use of each gestural category. Equal samples should be analyzed for each activity at each linguistic stage. Third, future investigation should also focus on the role of the affirmative nonverbal answer in the development of the verbal affirmative "yes." In this investigation the child used 85% of her Category III gestures to answer the mother's yes/no questions. The mother accepted the child's answers and continued the conversation. Therefore, specification of the role played by the nonverbal affirmative answer in the child's communication development is warranted.

Footnotes

1. The equipment used include: a Sony, 1/2 inch, reel to reel videotape recorder--Model AV-3600; Sony video camera--Model AVC-325DDX.

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